Clin. Lab. 2027;73:XXX-XXX
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CASE REPORT

Disseminated Tuberculosis Complicated by Esophageal-Mediastinal-Bronchopleural Fistula with Suspected Gastrointestinal Perforation

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ABSTRACT

Background: **Disseminated tuberculosis carries a high mortality.**
Case Presentation: **A 38-year-old woman had respiratory failure and cachexia. Extensive examinations supported diagnosis of severe disseminated tuberculosis with an esophageal-mediastinal fistula communicating with a bronchopleural fistula, suspected gastrointestinal perforation, and thoracic spinal tuberculosis (T2-4, T9). With aggressive anti-tuberculosis treatment, drainage, enhanced nutritional support, supportive care, and comprehensive intensive care, the infection was controlled, and the fistula and perforation were closed. The patient underwent surgery for spinal tuberculosis.**
Conclusions: **In patients with disseminated tuberculosis involving multiple organ systems and complications who cannot tolerate surgery, conservative treatment strategy may be an effective management approach. More comparative efficacy studies are required to confirm our findings here.**
(Clin. Lab. 2027;73:xx-xx. DOI: 10.7754/Clin.Lab.2026.260812)

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Case Report accepted September 7, 2026

KEYWORDS

tuberculosis, esophageal-mediastinal fistula, bronchopleural fistula, gastrointestinal perforation, case report

LIST OF ABBREVIATIONS

CT - Computed tomography

INTRODUCTION

Disseminated tuberculosis represents one of the most severe manifestations of Mycobacterium tuberculosis infection and is characterized by extensive involvement of multiple organ systems beyond the primary pulmonary focus [1]. Among the numerous complications associated with disseminated tuberculosis, the concurrent development of an esophageal-mediastinal fistula, bronchopleural fistula, and spontaneous gastrointestinal perforation is exceedingly rare but particularly severe.

Most fistulas and perforations require surgical repair, which may not be feasible in critically ill patients with tuberculosis. The management of such complex presentations is inherently challenging [2].

Here, we report a patient with disseminated tuberculosis complicated by an esophageal-mediastinal-bronchopleural fistula and suspected gastrointestinal perforation. We present the clinical course of this extremely rare case and share the diagnosis and treatment experience.

CASE PRESENTATION

On November 21, 2023, a 38-year-old woman presented with a 1-year history of cough, chest tightness, shortness of breath, fatigue, and poor appetite, which had worsened over the preceding 2 weeks (Figure 1). One year earlier, the patient developed depression following her divorce and maintained a strict vegetarian diet with very little daily food intake, resulting in progressive weight loss. Two weeks before presentation, she was able to consume only small amounts of liquids and became profoundly weak, remaining in bed most of the day and reluctant to speak.

The patient's vital signs were as follows: temperature 35.5℃, heart rate 105 beats/minute, respiratory rate 25 breaths/minute, and blood pressure 70/40 mmHg. She weighed 35 kg and was 160 cm tall, with a body mass index of 13.67 kg/m^2. She appeared cachectic and extremely weak, with scattered crackles in the left upper lung field. Her abdomen was soft and nontender. Neurological examination showed grade 0 muscle strength in all four extremities, with no pathological signs.

Laboratory tests showed a white blood cell count of 11.1 x 10^9/L, neutrophils of 10.5 x 10^9/L, hemoglobin of 89 g/L, procalcitonin of 0.92 ng/mL, C-reactive protein of 171.5 mg/L, prealbumin of 9 mg/L, and albumin of 18.5 g/L. In addition, there was evidence of type II respiratory failure (pH 7.37, PCO_2 49 mmHg, PO_2 52 mmHg). Chest computed tomography (CT) showed multiple lesions and cavitations in both lungs, with destruction of the left upper lobe (Figure 2A). Sputum and stool Xpert MTB/RIF tests were positive for *M. tuberculosis* and indicated rifampicin sensitivity. The sputum real-time fluorescent nucleic acid isothermal amplification test was also positive for *M. tuberculosis*. Later on, the sputum culture identified M. tuberculosis, sensitive to isoniazid, ethambutol, rifampicin, and levofloxacin. The patient was admitted with diagnoses of severe pulmonary tuberculosis, acute respiratory failure, intestinal tuberculosis, septic shock, and severe malnutrition. She received a blood transfusion, albumin infusion, endotracheal intubation with mechanical ventilation, cefoperazone-sulbactam (3 g, every 8 hour), and intravenous fluids. Bronchoscopy revealed a patent left main bronchus with mucosal edema and slight luminal narrowing. Purulent secretions were present at the orifices of the left upper and lower lobes and were removed by suction.

On the day after admission (November 22), the patient developed abdominal distension and a fever of up to 39.2℃, with persistent hypotension. Norepinephrine was initiated at 0.47 μg/kg/minute to maintain a mean arterial pressure of 70 mmHg. A nasogastric tube was inserted, and a large amount of gas was aspirated. Chest and abdominal CT with administration of the contrast agent iopamiron through the nasogastric tube revealed leakage of contrast material into cavities in the left upper lung. An esophageal-mediastinal fistula (Figure 2B) was identified, communicating directly with a left bronchopleural fistula (Figure 2C), and forming a continuous pathological tract. In addition, there was mediastinal emphysema, subcutaneous emphysema of the anterior chest wall and right shoulder, left pleural effusion, marked gastric distension, pneumoperitoneum suspicious for small intestinal perforation (Figure 2D), and bony destruction of the T2-4 and T9 vertebrae. Upper gastrointestinal endoscopy showed an esophageal fistula orifice located approximately 20 cm from the incisors. Therefore, the patient was diagnosed with disseminated tuberculosis involving the lungs, intestines, and thoracic vertebrae, along with an esophageal-mediastinal-left bronchopleural fistula and suspected gastrointestinal perforation.

A multidisciplinary team, including an infectious disease specialist, pulmonologist, gastroenterologist, general surgeon, thoracic surgeon, radiologist and TB ICU team, was assembled. After a comprehensive assessment, we concluded that, given the patient's critical condition and extremely poor overall status, surgical repair of the fistula and perforation would carry an unacceptably high risk and was therefore not feasible. We therefore decided to proceed with conservative treatment, which included anti-tuberculosis therapy with an intravenous regimen consisting of isoniazid 0.3 g daily, rifampin 0.45 g daily, levofloxacin 0.5 g daily, and linezolid 0.6 g daily. For drainage and decompression, a thoracic drainage catheter and an abdominal drainage catheter were placed under ultrasound guidance, and the tip of the nasogastric tube was adjusted to a position near the esophageal fistula for continuous negative-pressure suction. In addition, a rectal tube was placed for intestinal decompression. For nutritional support, a nasojejunal feeding tube was placed endoscopically and advanced beyond the fistula to provide enteral nutrition, while parenteral nutrition was administered to correct hypoproteinemia. Comprehensive supportive treatment included anti-infective therapy with cefoperazone-sulbactam (3 g, every 8 hour), transfusion of packed red blood cells, albumin infusion to correct hypoalbuminemia, glucocorticoids to control the inflammatory response associated with tuberculosis, norepinephrine (0.47 μg/kg/minute) to maintain blood pressure, sedation and analgesia, thymopeptide to enhance immunity, and psychological counseling when possible.

On hospital day 7 (November 27), the patient's abdominal distension had improved. Follow-up CT showed that the previously noted free air in the abdominal cavity

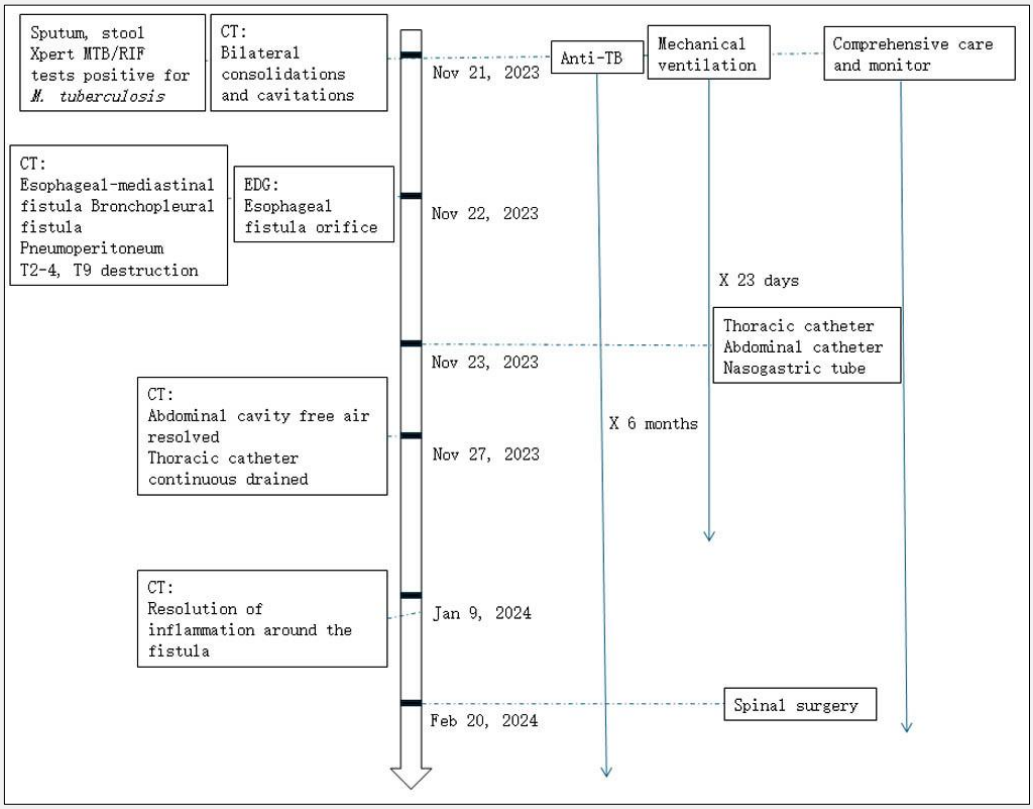


Figure 1. Timeline of the disease course in this patient.

had largely resolved, and no leakage of contrast material into the abdominal cavity was observed. However, the three-chamber thoracic drainage catheter continued to drain air and yellowish-white sputum. The nasogastric tube positioned at the esophageal fistula also showed continuous drainage with air leakage. On December 1, a percutaneous tracheotomy was performed. Postoperatively, the patient developed recurrent fever, excessive sputum production, and elevated inflammatory markers, suggesting pulmonary infection. On December 13th, enteral feeding was added to the parenteral nutrition regimen. The patient's vital signs stabilized, and her respiratory distress improved. Humidified oxygen was administered through the tracheostomy site, and she was successfully weaned from mechanical ventilation. On January 9, 2024, repeat CT showed improved resolution of inflammation around the fistula. The tracheostomy tube was successfully removed, and the stoma was closed on January 15. The patient was switched to high-flow nasal cannula oxygen therapy. Feeding via the nasogastric tube began on January 17, and she resumed oral intake independently on January 24. Oral anti-tuberculosis therapy was started as isoniazid 0.3 g daily, rifampicin 0.45 g daily, ethambutol 0.5 g daily, pyrazinamide 0.5 g three times a day, and moxifloxacin 0.4 g daily. On February 1st, 2024, contrast-enhanced magnetic resonance imaging showed bony destruction of the T2-4 and T9 vertebrae (Figure 2G, 2H). Physical examination revealed positive percussion tenderness over the thoracic spinous processes. Bilateral straight-leg raise and femoral nerve stretch tests were negative. Patellar reflexes were positive bilaterally. Achilles tendon reflexes were also positive both sides. Muscle tone was normal in both lower extremities with muscle strength graded as 4/5. Sensation and peripheral perfusion were normal in four extremities. On February 20, 2024, elective posterior cervical fusion, pedicle screw fixation + bone grafting + and scoliosis correction were performed. Postoperative pathology confirmed tuberculosis. The patient recovered well after surgery, with no residual neurological deficits. She was discharged on June 3, 2024, with oral medications, including isoniazid 0.3 g daily, rifampicin 0.45 g daily, ethambutol 0.5 g daily, and pyrazinamide 0.5 g three times a day, for a total of one year. Subsequent follow-up evaluation on July 25, 2024, showed satisfactory recovery (Figure 2F).

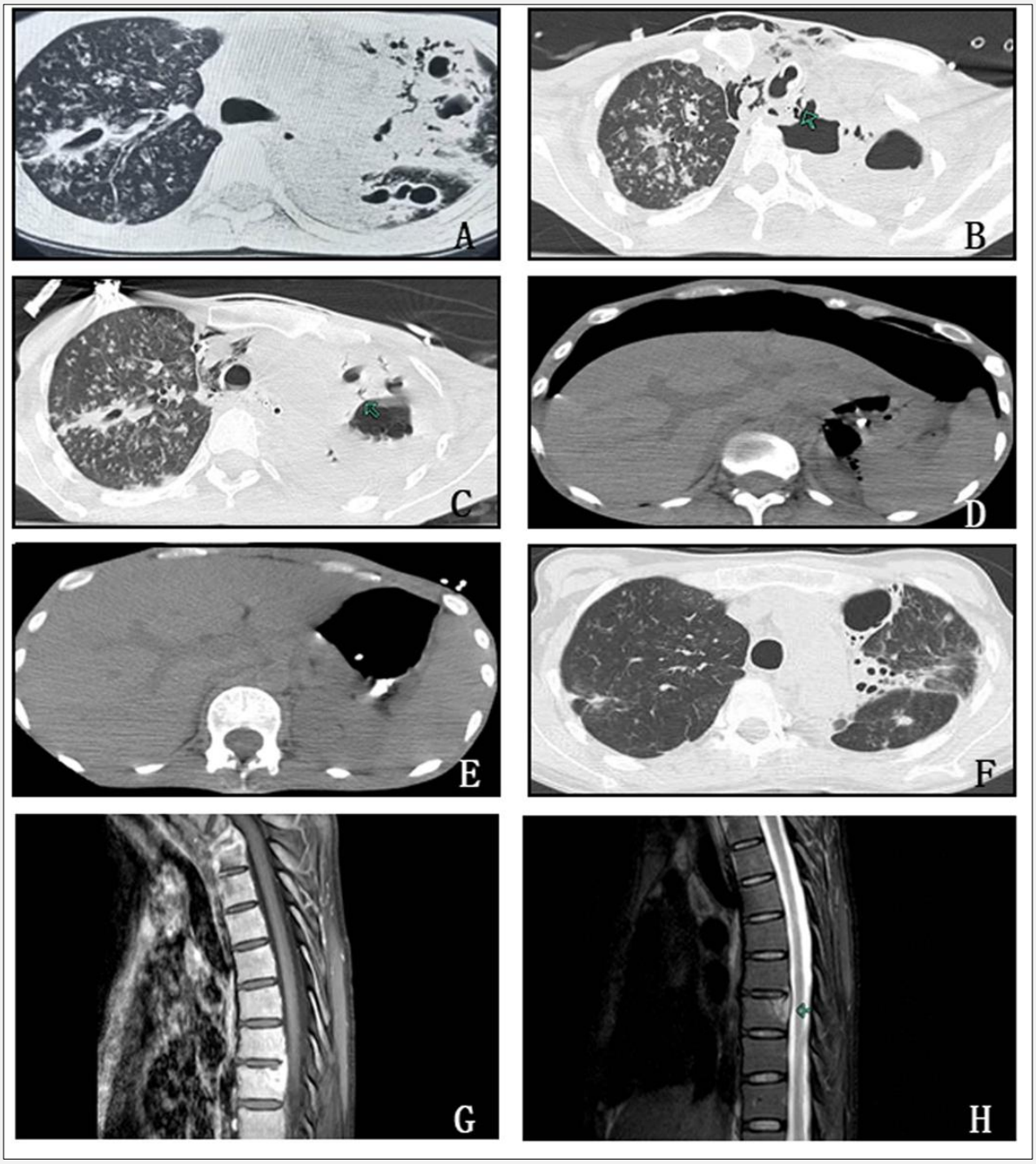


Figure 2. Computed tomography scan images.

A: On the day of hospital admission (November 21, 2023), there were multiple lesions and cavitations in the bilateral lungs, with destruction of the left upper lung lobe, B: (arrow) The next day after hospital admission (November 22, 2023), esophageal-mediastinal fistula, C: (arrow) bronchopleural fistula, and D: pneumoperitoneum suspected for small intestinal perforation were demonstrated, E: On November 27, 2023 (day 7 after hospital admission), abdominal distension and pneumoperitoneum had improved, F: On July 25, 2024, a clinical follow-up visit showed satisfactory recovery, G: On February 1st, 2024, an enhanced magnetic resonance imaging scan showed bony destruction of T2-4 and H: T9 vertebrae.

DISCUSSION

M. tuberculosis infection can involve multiple organ systems, leading to disseminated disease. Esophageal-mediastinal fistula, bronchopleural fistula, and gastrointestinal perforation have previously been reported in patients with tuberculosis [3-7]. However, the simultaneous coexistence of all three conditions in a single patient is extremely rare. Certain fistulas, especially those involving the gastrointestinal tract, require surgical repair [8]. Here, we report a patient with severe disseminated tuberculosis complicated by an esophageal-mediastinal-bronchopleural fistula and suspected gastrointestinal perforation. After multidisciplinary consultation, we implemented a comprehensive conservative management strategy, and the patient recovered successfully.

The coexistence of an esophageal-mediastinal fistula, bronchopleural fistula, and suspected gastrointestinal perforation created abnormal communication among the thoracic cavity, mediastinum, and abdominal cavity. Affected patients may develop sepsis, mediastinitis, empyema, and peritonitis. Gastrointestinal perforation can also make oral nutritional intake impossible. Although surgical repair is considered the definitive treatment, this patient presented with severe cachexia, extensive pulmonary destruction, and disseminated infection, all of which were associated with an extremely high risk of surgical mortality. Therefore, after multidisciplinary team evaluation, the decision to pursue aggressive conservative medical management represented the most appropriate approach for this patient. Our conservative management strategy integrated several components, including infection control [9], appropriate drainage [10, 11], nutritional support [12,13], adequate supportive care, and a staged treatment strategy**:** after the patient's general condition had improved significantly with conservative management, definitive surgical treatment for spinal tuberculosis was performed at an appropriate time. Finally, the patient achieved recovery.

The strength of our study was the detailed documentation and descriptions of the diagnosis and treatment process in this patient with tuberculosis complications involving multiple organ systems. The limitations included single case report, which could restrict the generalizability of findings. We were not able to provide direct evidence of gastrointestinal perforation. The diagnosis of gastrointestinal perforation was mainly based on pneumoperitoneum. We also did not have repeat contrast-enhanced CT or endoscope examination to visualize the healed fistulas, although patient clinical improvement and satisfactory recovery indirectly supported that the fistulas had been healed.

CONCLUSION

By prioritizing multidisciplinary collaboration centered on intravenous anti-tuberculosis therapy, multisite drainage, and rigorous critical care, clinical stabilization and fistula closure were achieved, ultimately allowing definitive surgery for spinal tuberculosis. Our findings suggest that, for selected patients with high-acuity tuberculous complications, a systematic and individualized strategy integrating continuous organ monitoring with early rehabilitation may be an effective alternative to immediate surgical intervention. In addition, continuous nutritional support, comprehensive care, and psychological consultation are important for improving outcomes in malnourished patients with severe disseminated tuberculosis. More comparative efficacy studies are required to confirm our findings here.

Ethics Approval and Consent to Participate:
This study was approved by the ethics committee of Zhejiang Provincial Hospital of Integrated Traditional Chinese and Western Medicine. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The participant provided written informed consent.

Consent to Publish:
Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Availability of Data and Materials:
The datasets generated and analyzed during the present study are available from the corresponding author on reasonable request.

Source of Fund:
This study did not receive any funding in any form.

Declaration of Generative AI in Scientific Writing:
AI tools were not used to generate original research data, conduct independent analyses, interpret results autonomously, or draw scientific conclusions. All scientific reasoning, methodological decisions, data interpretation, and conclusions were developed and validated exclusively by the author(s).

Declaration of Interest:
We declare that we have no conflicts of interest.

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